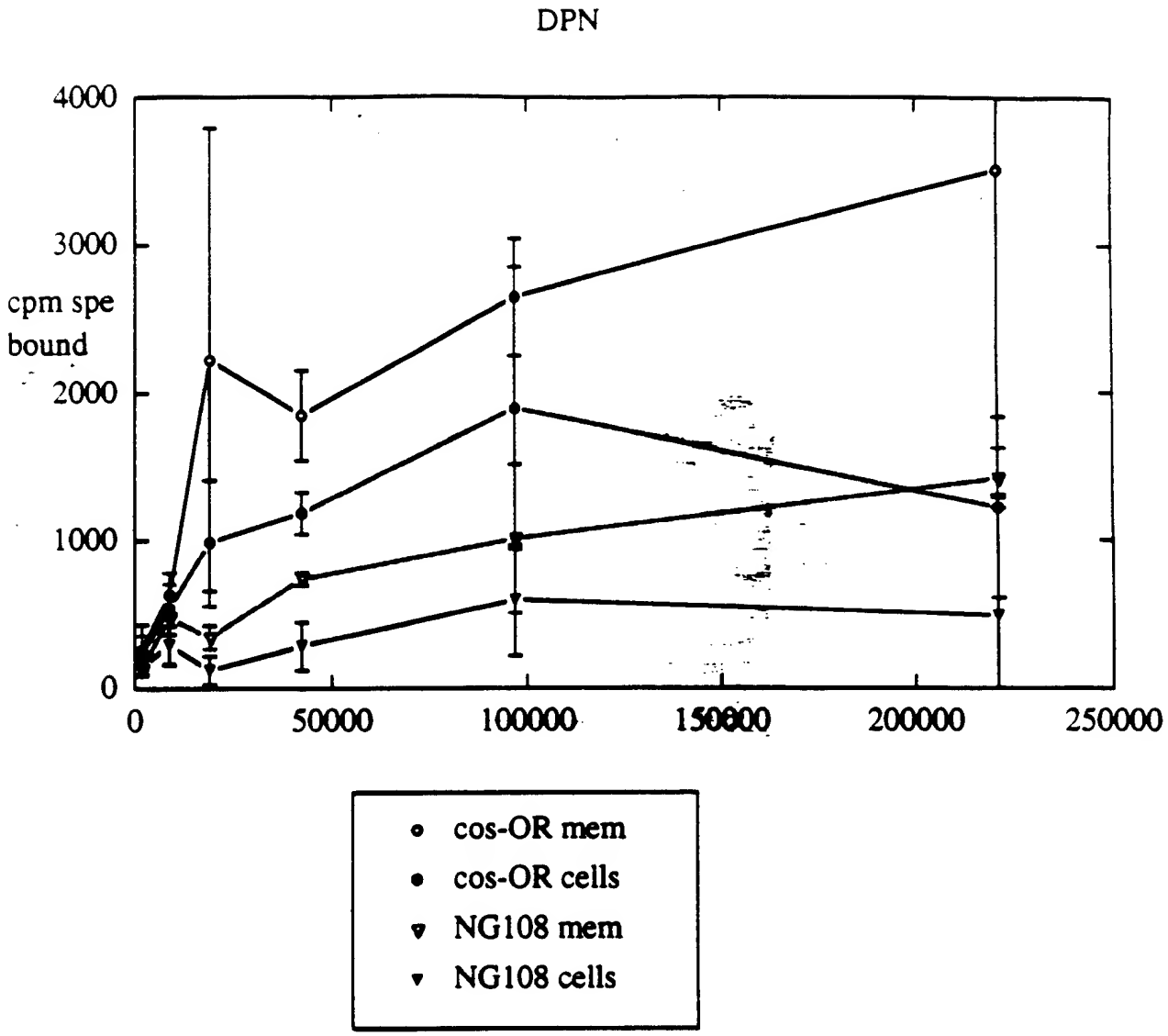
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cos-OR cells
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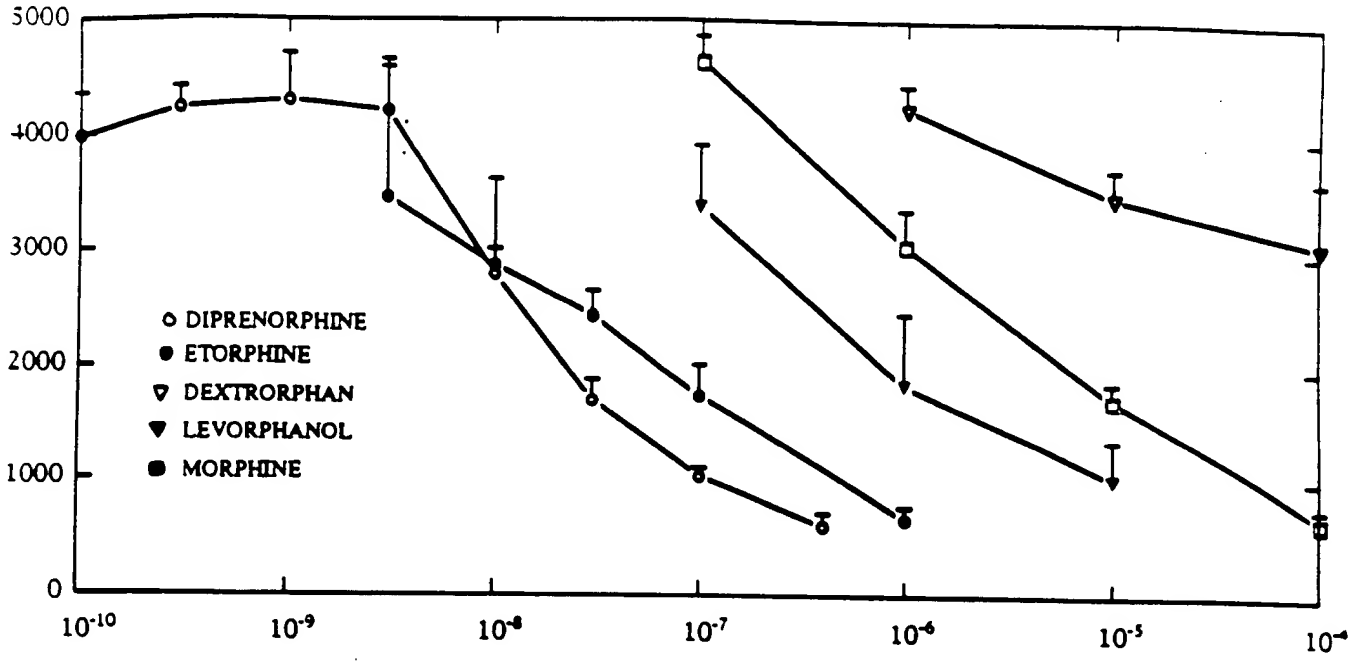
NG108 cells

Fig. 1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ETORPHINE
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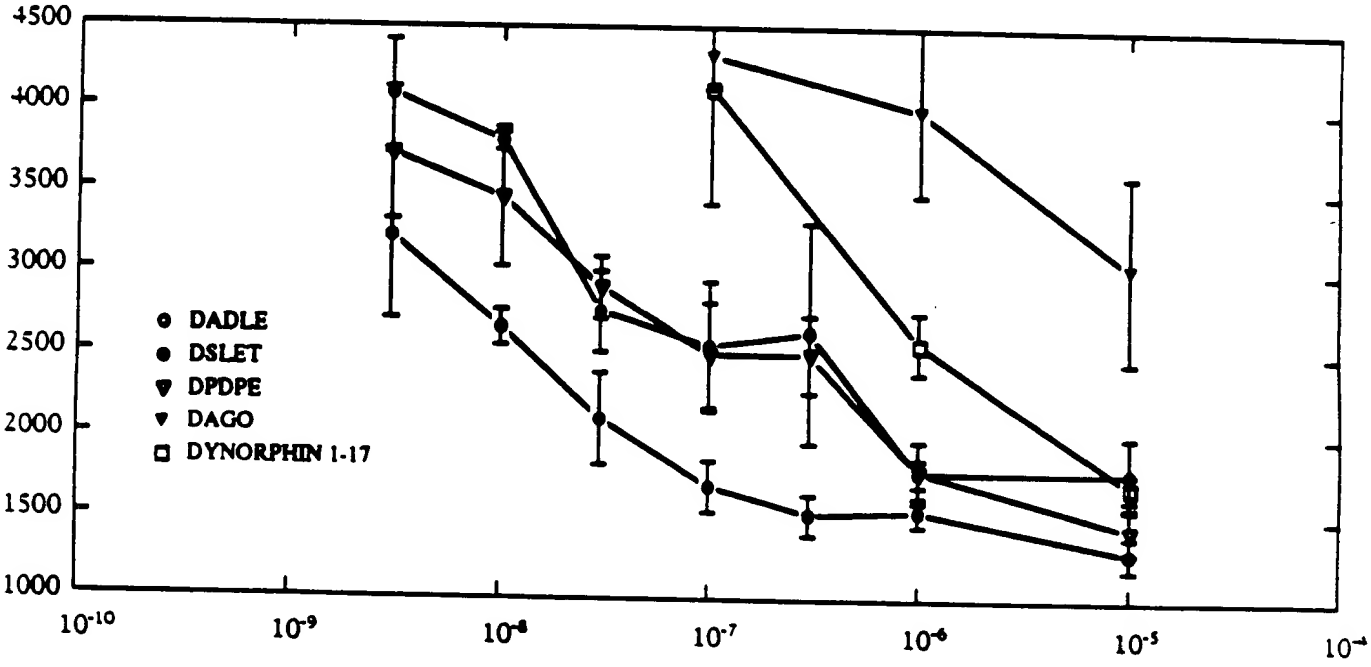
10-6
10-5
10-4

Fig. 2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10-4

Fig. 3

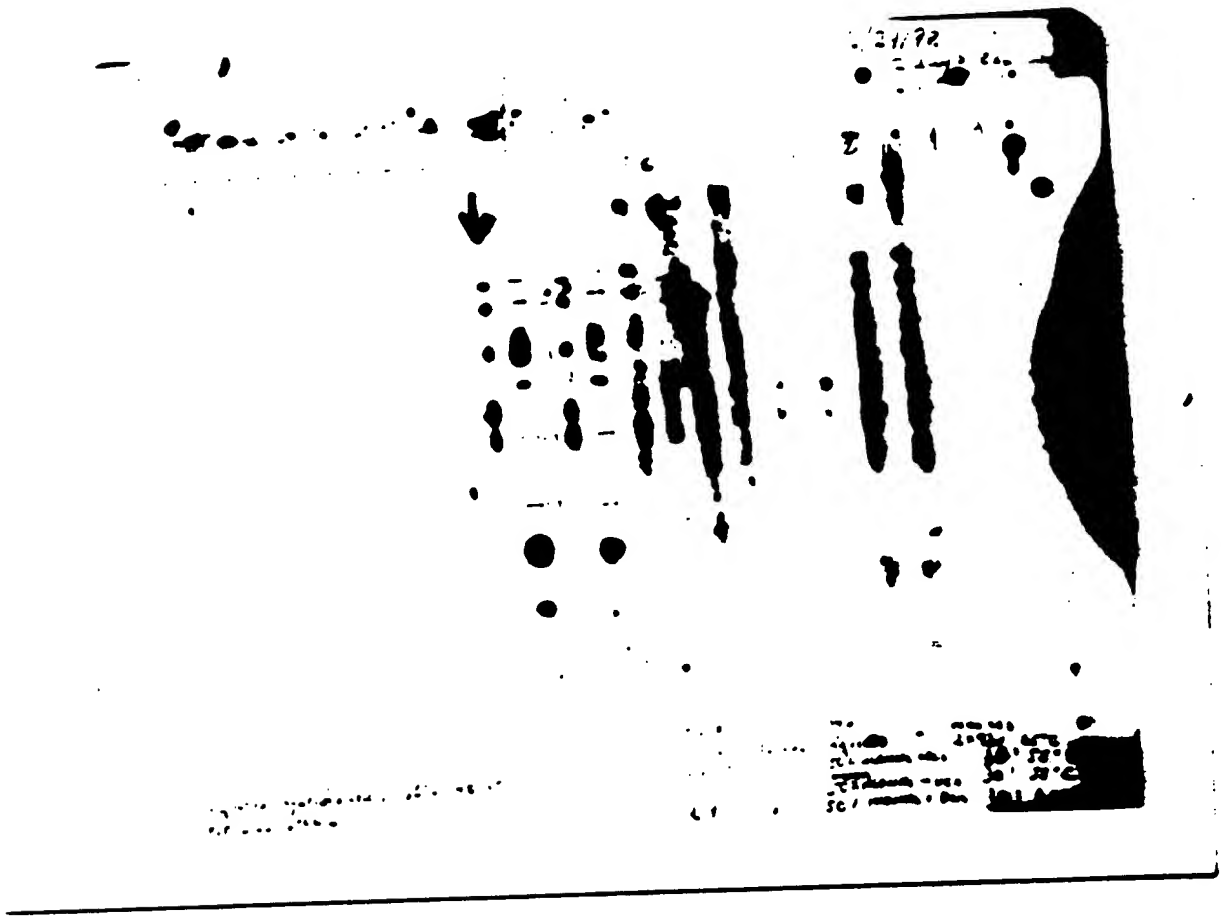

Fig. 4

GCACGGTGGAGACGGACACGGCGGCGCCATG GAG CTG GTG CCC TCT GCC CGT GCG GAG CTG CAG TCC TCG CCC C
Met Glu Leu Val Pro Ser Ala Arg Ala Glu Leu Gln Ser Ser Pro L

GTC AAC CTC TCG GAC GCC TTT CCC AGC GCC TTC CCC AGC GCG GGC GCC AAT GCG TCG GGG TCG CCG G
Val Asn*Leu Ser Asp Ala Phe Pro Ser Ala Phe Pro Ser Ala Gly Ala Asn*Ala Ser Gly Ser Pro G

GCC CGT AGT GCC TCG TCC CTC GCC CTA GCC ATC GCC ATC ACC GCG CTC TAC TCG GCT GTG TGC GCA G
Ala Arg Ser Ala Ser Ser Leu Ala Leu Ala Ile Ala Ile Thr Ala Leu Tyr Ser Ala Val Cys Ala V

GGG CTT CTG GGC AAC GTG CTC GTC ATG TTT GGC ATC GTC CGG TAC ACC AAA TTG AAG ACC GCC ACC A
Gly Leu Leu Gly Asn Val Leu Val Met Phe Gly Ile Val Arg Tyr Thr Lys Leu Lys Thr Ala Thr A

ATC TAC ATC TTC AAT CTG GCT TTG GCT GAT GCG CTG GCC ACC AGC ACG CTG CCC TTC CAG AGC GCC A
Ile Tyr Ile Phe Asn Leu Ala Leu Ala Asp Ala Leu Ala Thr Ser Thr Leu Pro Phe Gln Ser Ala L

TAC TTG ATG GAA ACG TGG CCG TTT GGC GAG CTG CTG TGC AAG GCT GTG CTC TCC ATT GAC TAC TAC A
Tyr Leu Met Glu Thr Trp Pro Phe Gly Glu Leu Leu Cys Lys Ala Val Leu Ser Ile Asp Tyr Tyr A

ATG TTC ACT AGC ATC TTC ACC CTC ACC ATG ATG AGC GTG GAC CGC TAC ATT GCT GTC TGC CAT CCT G
Met Phe Thr Ser Ile Phe Thr Leu Thr Met Met Ser Val Asp Arg Tyr Ile Ala Val Cys His Pro V

AAA GCC CTG GAC TTC CGG ACA CCA GCC AAG GCC AAG CTG ATC AAT ATA TGC ATC TGG GTC TTG GCT T
Lys Ala Leu Asp Phe Arg Thr Pro Ala Lys Ala Lys Leu Ile Asn Ile Cys Ile Trp Val Leu Ala S

GGT GTC GGG GTC CCC ATC ATG GTC ATG GCA GTG ACC CAA CCC CGG GAT GGT GCA GTG GTA TGC ATG C
Gly Val Gly Val Pro Ile Met Val Met Ala Val Thr Gln Pro Arg Asp Gly Ala Val Val Cys Met L

CAG TTC CCC AGT CCC AGC TGG TAC TGG GAC ACT GTG ACC AAG ATC TGC GTG TTC CTC TTT GCC TTC G
Gln Phe Pro Ser Pro Ser Trp Tyr Trp Asp Thr Val Thr Lys Ile Cys Val Phe Leu Phe Ala Phe V

GTG CCG ATC CTC ATC ATC ACG GTG TGC TAT GGC CTC ATG CTA CTG CGC CTG CGC AGC GTG CGT CTG C
Val Pro Ile Leu Ile Ile Thr Val Cys Tyr Gly Leu Met Leu Leu Arg Leu Arg Ser Val Arg Leu L

TCC GGT TCC AAG GAG AAG GAC CGC AGC CTG CGG CGC ATC ACG CGC ATG GTG CTG GTG GTG GTG GGC G
Ser Gly Ser Lys Glu Lys Asp Arg Ser Leu Arg Arg Ile Thr Arg Met Val Leu Val Val Val Gly A

TTC GTG GTG TGC TGG GCG CCC ATC CAC ATC TTC GTC ATC GTC TGG ACG CTG GTG GAC ATC AAT CGG C
Phe Val Val Cys Trp Ala Pro Ile His Ile Phe Val Ile Val Trp Thr Leu Val Asp Ile Asn Arg A

GAC CCA CTT GTG GTG GCC GCA CTG CAC CTG TGC ATT GCG CTG GGC TAC GCC AAC AGC AGC CTC AAC C
Asp Pro Leu Val Val Ala Ala Leu His Leu Cys Ile Ala Leu Gly Tyr Ala Asn Ser Ser Leu Asn P

GTT CTC TAC GCC TTC CTG GAC GAG AAC TTC AAG CGC TGC TTC CGC CAG CTC TGT CGC ACG CCC TGC G
Val Leu Tyr Ala Phe Leu Asp Glu Asn Phe Lys Arg Cys Phe Arg Gln Leu Cys Arg Thr Pro Cys G

CGC CAA GAA CCC GGC AGT CTC CGT CGT CCC CGC CAG GCC ACC ACG CGT GAG CGT GTC ACT GCC TGC A
Arg Gln Glu Pro Gly Ser Leu Arg Arg Pro Arg Gln Ala Thr Thr Arg Glu Arg Val Thr Ala Cys T

CCC TCC GAC GGC CCG GGC GGT GGC GCT GCC GCC TGA CCTACCCGACCTTCCCCTTAAACGCCCCTCCCAAGTGAAGT
Pro Ser Asp Gly Pro Gly Gly Gly Ala Ala Ala ***

CAGAGGCCACACCGAGCTCCCTGGGAGGCTGTGGCCACCACCAGGACAGCTAGAATTGGGCCTGCACAGAGGGGAGGCCTCCTGTGGGG
GGCCTGAGGGATCAAAGGCTCCAGGTTGGAACGGTGGGGGTGAGGAAGCAGAGCTGGTGATTCCTAAACTGTATCCATTAGTAAGGCCT
AATGGGACAGAGCCTCCGCCTTGAGATAACATCGGGTTCTGGCCTTTTTGAACACCCAGCTCCAGTCCAAGACCCAAGGATTCCAGCTC
AACCAGGAGGGGCAGTGATGGGGTCGATGATTTGGTTTGGCTGAGAGTCCCAGCATTTGTGTTATGGGGAGGATCTCTCATCTTAGAGA
AAGGGGACAGGGCATTCAGGCAAGGCAGCTTGGGGTTTGGTCAGGAGATAAGCGCCCCCTTCCCTTGGGGGGAGGATAAGTGGGGGATG
ACGTTGGAGAAGAGTCAAAGTTCTCACCACCTTTCTAACTACTCAGCTAAACTCGTTGAGGCTAGGGCCAACGTGACTTCTCTGTAGAG
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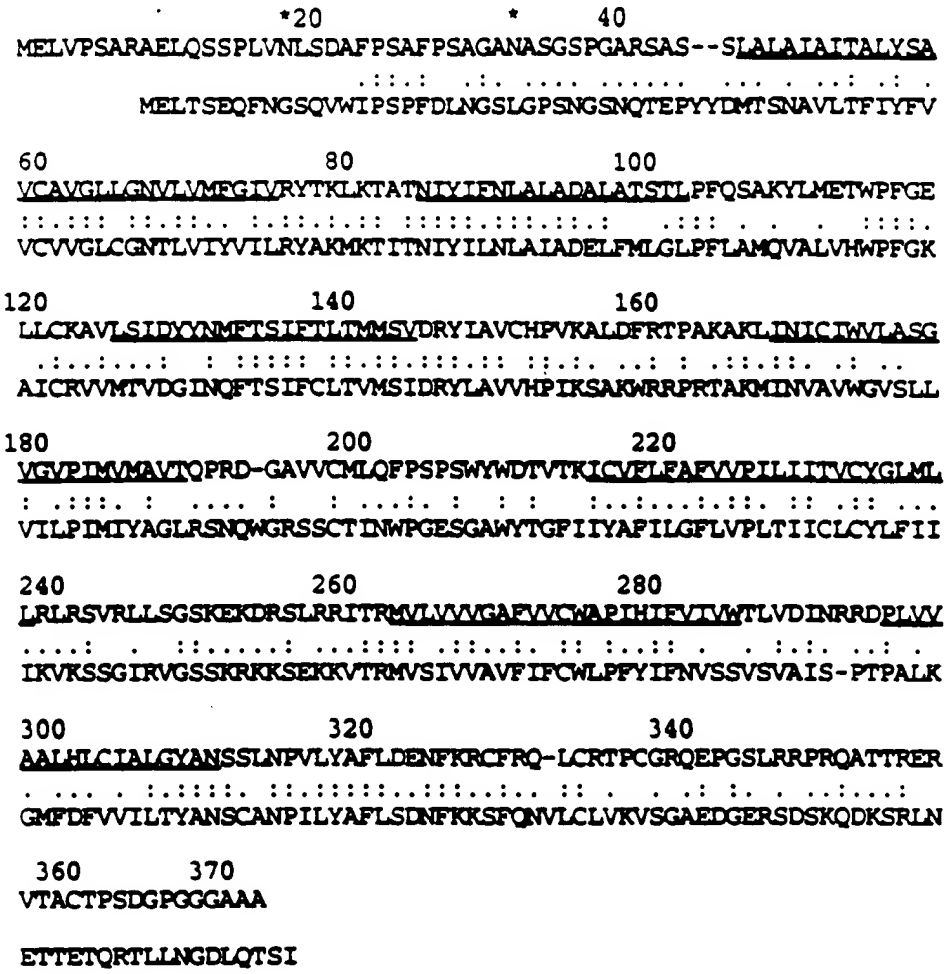
Fig. 5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MELTSEQFNGSQVWIPSPFDLNGSLGPSNGSNQTEPYYDMTSNAVLTFIYFV
60 80 100
VCAVGLLGNVLVMFGIVRYTKLKTATNIYIFNLALADALATSTLPFQSAKYLMETWPFGE
VCVVGLCGNTLVIYVILRYAKMKTITNIYILNLAIADELFMLGLPFLAMQVALVHWPFGK
120 140 160
LLCKAVLSIDYYNMFTSIFTLTMMSVDRYIAVCHPVKALDFRTPAKAKLINICIWVLASG
AICRVVMTVDGINQFTSIFCLTVMSIDRYLAVVHPIKSAKWRRPRTAKMINVAVWGVSLL
180 200 220
VGVPIMVMAVTQPRD-GAVVCMLQFPSPSWYWDTVTKICVFLFAFVVPILIITVCYGLML
VILPIMIYAGLRSNQWGRSSCTINWPGESGAWYTGFIIYAFILGFLVPLTIICLCYLFII
240 260 280
LRLRSVRLLSGSKEKDRSLRRITRMVLVVVGAFVVCWAPIHIFVIVWTLVDINRRDPLVV
IKVKSSGIRVGSSKRKKSEKKVTRMVSIVVAVFIFCWLPFYIFNVSSVSVAIS-PTPALK
300 320 340
AALHLCIALGYANSSLNPVLYAFLDENFKRCFRQ-LCRTPCGRQEPGSLRRPRQATTRER
GMFDFVVILTYANSCANPILYAFLSDNFKKSFQNVLCLVKVSGAEDGERSDSKQDKSRLN
360 370
VTACTPSDGPGGGAAA
ETTETQRTLLNGDLQTSI

Fig. 6.

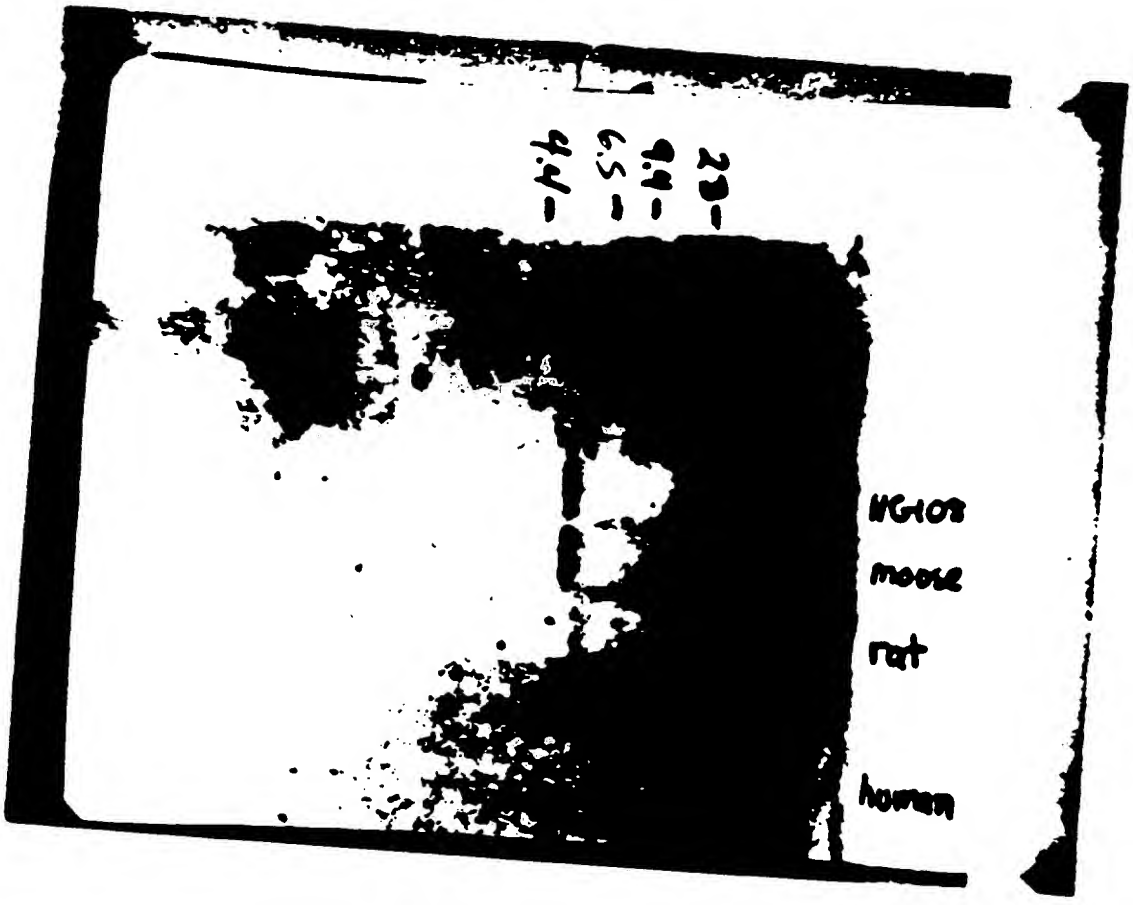

Fig. 7

HUMAN DELTA

Sequence Range: -131 to -1

```
                        -122          -112          -102          -92           -82
                          *             *             *             *             *
Tuyet's H3   -GG GCA GTG GTG TGC ATG CTC CAG TTC CCC AGC CCC AGC TGG TAC TGG GAC ACG

DOR-1          610           620           630           640           650           660
[  478 ]     gGt GCA GTG GTa TGC ATG CTC CAG TTC CCC AGt CCC AGC TGG TAC TGG GAC ACt>
             -^v ^^^ ^^^ ^^v ^^^ ^^^ ^^^ ^^^ ^^^ ^^^ ^^v ^^^ ^^^ ^^^ ^^^ ^^^ ^^^ ^^v

                    -72           -62           -52           -42           -32
                     *             *             *             *             *
Tuyet's H3   GTG ACC AAG ATC TGC GTG TTC CTC TTC GCC TTC GTG GTG CCC ATC CTC ATC ATC

DOR-1                670           680           690           700           710
[  478 ]     GTG ACC AAG ATC TGC GTG TTC CTC TTt GCC TTC GTG GTG CCg ATC CTC ATC ATC>
             ^^^ ^^^ ^^^ ^^^ ^^^ ^^^ ^^^ ^^^ ^^v ^^^ ^^^ ^^^ ^^^ ^^v ^^^ ^^^ ^^^ ^^^

                -22           -12           -2
                 *             *             *
Tuyet's H3   ACC GTG TGC TAT GGC CTC ATG CT

DOR-1             720           730
[  478 ]     ACg GTG TGC TAT GGC CTC ATG C>
             ^^v ^^^ ^^^ ^^^ ^^^ ^^^ ^^^ ^
```

Figure 8a

08/403260

10 20 30 40
CCT G[illegible] CTT TTG GGG ATG TGC TGT GCA AGA TAG TAA TTT CCA TTG

50 60 70 80 90
ATT ACT ACA ACA TGT TCA CCA GCA TCT TCA CCT TGA CCA TGA TGA

100 110 120 130
GCG TGG ACC GCT ACA TTG CCG TGT GCC ACC CCG TGA AGG CTT TGG

140 150 160 170 180
ACT TCC GCA CAC CCT TGA AGG CAA AGA TCA TCA ATA TCT GCA TCT

190 200 210 220
GGC TGC TGT CGT CAT CTG TTG GCA TCT CTG CAA TAG TCC TTG GAG

230 240 250 260 270
GCA CCA AAG TCA GGG AAG GTA AGA GCA GTC ATT TCA TTC TGT TCA

280 290 300 310
TAA AAA TGT AGC TTC AAA TTA CAT AGA CTT TTA ATT TGA GCG TGA

320 330 340 350 360
GTA GGC CAC ATA TTT GTG GAA ATC GAT GCC AAA AGA CGA CGG AAA

370 380 390 400
TGT AGT GCC TAA ATC CAT GGA AGA TGA GAA GTA GAA CAA TTT TTT

410 420 430 440 450
GTC CCT TTC CAC CTC TAA ACA CAG AAT GCA ATA ATG ACA TTG CCA

460 470 480 490
GAA GAG AGA TGC CCG ACC TGT CTC CCA TTC TGG CAA TGT TTA GTA

500 510 520 530 540
GAA AGT GGA GGG GTG AGG ATG AGG TAA GAA CCA CAG GCA TGT AGA

550 560 570 580
TTT TAA AGT ACA ACC TGG CAA GTC CAG ACA CAC CTT CTC ACT CCT

590 600 610 620 630
TTT TTT CTC TTT AAC AAG GGA TAT AAA TTA TTG GTG ACA TAT GCT

640 650 660 670
GGT TGT TTC CTC TTT TAT TCC TAA AGG ATA ACC TCC AAA TCA CTA

680 690 700 710 720
TTT TAA CAG CTT TGG CGT AGG ATC TCA AAA TCA AGT TAA CGG ATG

Figure 8b (1)

```
          730         740         750         760
          *           *           *           *
GTA GTT ACA GAT GAG TCA GAA CCA CTT GAT TTG GAC ATA TCA GGT

      770         780         790         800         810
      *           *           *           *           *
TTT CCC TTG CAA ACC AGC CAA CTG ATT TTT TTT TTT TTT TTT TTT

          820         830         840         850
          *           *           *           *
GAG AGA GAG TCT TGC TCT GTT GCC AGG CTA GAG TGC AGT GGC GCG

      860         870         880         890         900
      *           *           *           *           *
ATA TCG GCT CAC TGC AAC CTC TGC CTC CCG GGT TCA ACC TCA GCC

          910         920         930         940
          *           *           *           *
TCT CGA GTA GCT GGG ACT ACT GGC ACA CAC CAC CAT GCC CAG CTA

      950         960         970         980         990
      *           *           *           *           *
ATT TTT GTA TTT TTA GTA GAG ACA GGG TTT CAC CGT GTT GGC CAG

          1000        1010        1020        1030
          *           *           *           *
GGT GGT CTC AAT CTC TTG ACC TCG TGA TCT GCC CGC CTC GNC TCC

    1040        1050        1060        1070        1080
    *           *           *           *           *
CCA AAG TGC TGG GAT TAC AGG CGT GCN CTG CNC CCG NCC CCT GTT

          1090        1100        1110        1120
          *           *           *           *
GAT GTT TTT CCT GTA TTT CTA GGA CAG TAG TTC TCA CTC TGG GCT

    1130        1140        1150        1160        1170
    *           *           *           *           *
GCA CAT TGG AAT CAC CTG GGT ACT TTA GAA AAC ACT GCT GCC TGC

          1180        1190        1200        1210
          *           *           *           *
ATC CCA CCC CTT AAG GGT CTG GTG TAA TTG ACC TGG GGT ACA GCC

    1220        1230        1240        1250        1260
    *           *           *           *           *
TGG GTG TCA AGA TTT TTG AGC TCT CTC CAG GTG ACT CTG ACC TGC

          1270        1280        1290        1300
          *           *           *           *
AGC CAA GGT GAG AGG TAC TGT TCT AGG AGT TTT GCT TTA CTA GCA

    1310        1320        1330        1340        1350
    *           *           *           *           *
AAA TAT AAA GCT ATA GAA AGC ATC TTT TGT TCC TCA TAG AAA TTA

          1360        1370        1380        1390
          *           *           *           *
ATG ATG GGG AGG TGA GCA GAA TAG TCA CTC TGG GCC TAC TCA TGC

    1400        1410        1420        1430        1440
    *           *           *           *           *
```

Figure 8b (2)

TGT TTA [redacted]C CAG CAG GTA TAT AGG TTC TC[redacted] TAC TAG GGG

1450 1460 1470 1480

GTT CAT AAT ACC TGT GAG AGC AGA TAA CTG AGT GTA TAT AGT GAG

1490 1500 1510 1520 1530

GAT TTC CAG GTC ATA GTG AAA GGG CAA GGC ACT AAA ATC ATA GCT

1540 1550 1560 1570

TGT CTT GCA TAT ACT GTT TGT TTG TTT TTA GAC TTA CAT GTT AGG

1580 1590 1600 1610 1620

TTT CAG TTT ACG TTT TAG GTT CAC AGC AAA ACT GAC CAG AAA GCA

1630 1640 1650 1660

CAG AGA GGC ACT TCN ATT TAC CTC CAT TTA CCC CAC ACA GGC ACA

1670 1680 1690 1700 1710

TCC TCC CCT ACA GAG TGG TCC ATT TAT TAC AGC TGC TGA ACC CAC

1720 1730 1740 1750

ACT GAC ACG CTG TTA TCA CTC AGA GCC TGG CAG TTT ACA GAG GCT

1760 1770 1780 1790 1800

CAC TCT CCG NTA TGT GTC CTG TGN TTT GAA CAA ATG TAT AAT GAC

1810 1820 1830 1840

TTT ATT CAT TGT TTT TTA ATG AAG CTG ATC TTT TCC CTC TGA AAC

1850 1860 1870 1880 1890

TAC AAA ATG AAT TTC TAG CAT AGC CAT AGC AGG TGT CAA GCT ATA

1900 1910 1920 1930

CTA CTA GGT AAA TTT TAA GAA ATG CCC AAC TTT ATC ATA TTT GCA

1940 1950 1960 1970 1980

TTT CAA AAT ATG ATT AAT CAC ACA TAG GAT TTT GTT TCT TCA TGC

1990 2000 2010 2020

CTA CAG CAA ATA GAA ATA AAG TGC AAG AAA CTT TTC TGA GGC AAA

2030 2040 2050 2060 2070

GCT TTC ACT TTG TGA ACG TAA AAT GTT GAC TCT AAT ATT TTC CAT

2080 2090 2100 2110

ACT GTA GTA TAT GTG TGT GTA TTA TGT GAG GAT TCA TAG TCT GCT

2120 2130 2140 2150 2160

Figure 8b (3)

```
                                                                    *
CTT ACT TTT TTA TAG TAG CTA AGA ATT ATT ATA ATC GCT ATA AGC
          2170        2180        2190        2200
           *           *           *           *
AGA AAC AAT TAT TCT TAA CAA AAT GAA TAC ACA CAA GAA AAG CTT
  2210        2220        2230        2240        2250
   *           *           *           *           *
TAG TTT AGC TAT TAG AAC TAA CTC TAT AAT TAT GAT AAC CAT GAG
          2260        2270        2280        2290
           *           *           *           *
ATG CTG GAA CAG GAG CCA GCA GAA GCC ACA GCC CTC TGA TAT TAA
  2300        2310        2320        2330        2340
   *           *           *           *           *
TAT ATA AAG AAA CCA AAA TCT GCT TGT TAA ACT GAG GCA GTT GTA
          2350        2360        2370        2380
           *           *           *           *
TGG ATA CTT CAA CCT GAA AAT GCC CCC TTC TTC CTG AAA CAG AAC
  2390        2400        2410        2420        2430
   *           *           *           *           *
ATT TAA TAA AAA TGG CAT GCT TGG ACA GGA ATT TCT TTT TTA AAA
          2440
           *
AAT GCT TAG TTT TTA TG
```

Figure 8b (4)

```
                                    20          30          40
    TTT TAT CTC CTA GAT ACA CCA A       GA CTG CCA CCC ACA
    50          60          70          80          90
TCT ACA TTT TCA ACC TTG CTC TGC AGA TGC CTT AGC CAC CAG TAC
          100         110         120         130
CCT GCC CTT CCA GAG TGT GAA TTA CCT AAT GGG AAC ATG GCC ATT
   140         150         160         170         180
TGG AAC CAT CCT TTG CAA GAT AGT GAT CTC CAT AGA TTA CTA TAA
          190         200         210         220
CAT GTT CAC CAG CAT ATT CAC CCT CTG CAC CAT GAG TGT TGA TCG
   230         240         250         260         270
ATA CAT TGC AGT CTG CCA CCC TGT CAA GGC CTT AGA TTT CCG TAC
          280         290         300         310
TCC CCN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN
   320         330         340         350         360
NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN NNN
          370         380         390         400
NNN NNN NNG TTC CAT AGA TTG TAC ACT AAC ATT CT  TCA TCC AAC
   410         420         430         440         450
CTG GTA CTG GGA AAA CCT GCT GAA GAT CTG TGT TTT CAT CTT CGC
          460         470         480         490
CTT CAT TAT GCC AGT GCT CAT CAT TAC CGT GTG CTA TGG ACT GAT
   500         510         520         530         540
GAT CTT GCG CCT CAA GAG TGT CCG CAT GCT CTC TGG CTC CAA AGA
          550         560         570         580
AAA GGA CAG GAA TCT TCG AAG GAT CAC CAG GAT GGT GCT GGT GGT
   590         600         610         620         630
GGT GGC TGT GTT CAT CGT CTG CTG GAC TCC CAT TCA CAT TTA CGT
          640         650         660         670
CAT CAT TAA AGC CTT GGT TAC AAT CCC AGA AAC TAC GTT CCA GAC
   680         690         700         710         720
TGT TTC TTG GCA CTT CTG CAT TGC TCT AGG TTA CAC AAA CAG CTG

          730         740         750         760
CCT CAA CCC AGT CCT TTA TGC ATT TCT GGA TGA AAA CTT CCA CGA
   770         780         790         800         810
TGC TTC AGA GAG TTC TGT ATC CCA ACC TCT TCC AAC ATT GAG CAA
          820         830
CAA AAC TCC ACT CGA ATT CC
```

Figure 8c

```
          10          20          30          40
          *           *           *           *
GGG TAC CGG GCC CCC CCT CGA GGT CGA CGG TAT CGA TAA GCT TGA

    50          60          70          80          90
    *           *           *           *           *
TAT CGA ATT CTT ACT GAA TTA GGT ATC TTT CTT CAC ACT ACT TGG

          100         110         120         130
          *           *           *           *
TAA AAA AAA TGA AAA GGC AGA AAA ATT AGC CCC AAA AGA GAT GAA

   140         150         160         170         180
    *           *           *           *           *
ACT CTT CCG TCC ATC ACC ATT GAC TCT ATT GTG AAC TTA TGA AAA

          190         200         210         220
          *           *           *           *
AGG TAG TTG AGC AAT ATG AAG GCC ATG ATG TGG AAT TAA ACA CAC

   230         240         250         260         270
    *           *           *           *           *
ACA CAC ACA CAC ACA CAC ACA CAC ACA CAT GCT GGA TTC TAA ATG

          280         290         300         310
          *           *           *           *
TGT CCT TCC TCC TCT CAC TCT CTT GAT TCA AGT TTA TTT CTG AAC

   320         330
    *           *
TGA GAC ACG ATC ACC AC
```

Figure 8d

```
          10          20          30          40
CGG ATC CTT AGC ATC CCC AAA GCG CCT CCG TGT ACT TCT AAG GTG

  50          60          70          80          90
GGA GGG GGA TAC AAG CAG AGG AGA ATA TCG GAC GCT CAG ACG TTC

         100         110         120         130
CAT TCT GCC TGC CGC TCT TCT CTG GTT CCA CTA GGG CTT GTC CTT

 140         150         160         170         180
GTA AGA AAC TGA CGG AGC CTA GGG CAG CTG TGA GAG GAA GAG GCT

         190         200         210         220
GGG GCG CCT GGA ACC CGA ACA CTC TTG AGT GCT CTC AGT TAC AGN

 230         240         250         260         270
CTA CCG AGT CCG CAG GAA GCA TTC AGA ACC ATG GAC AGC AGC GCC

         280         290         300         310
GGC CCA GGG AAC ATC AGC GAC TGC TCT GAC CCC TTA GCT CCT GCA

 320         330         340         350         360
AGT TGC TCC CCA GCA CCT GGC TCC TGG CTC AAC TTG TCC CAC GTT

         370         380         390         400
GAT GGA AAC CAG TCC GAC CCA TGC GGT CCT AAC CCG ACG GGC CTT

 410         420         430         440         450
GGC GGG AAC GAC AGC CTG TGC CCT CAG ACC GGC AGC CCT TCC ATG

         460         470         480         490
GTC ACA GCC ATC ACC ATC ATG GCC CTC TAT TCT ATC GTG TGT GTA

 500         510         520         530         540
GTG GGC CTC TTT GGA AAC TTC CTG GTC ATG TAT GTG ATT GTA AGA

         550         560         570         580
TAT ACC AAA ATG AAG ACT GCC ACC AAC ATC TAC ATT TTC AAC CTT

 590         600         610         620         630
GCT CTG GCA GAT GCC TTA GCC ACT AGC ACG CTG CCC TTT CAG AGT

         640         650         660         670
GTT AAC TAC CTG ATG GGA ACG TGG CCC TTT GGA AAC ATC CTC TGC

 680         690         700         710         720
AAG ATC GTG ATC TCA ATA GAC TAC TAC AAC ATG TTC ACC AGT ATC
```

Figure 9 (1)

```
          730         740         750         760
TTC ACC CTC TGC ACC ATG AGT GTA GAC CGC TAC ATT GCC GTC TGC
    770         780         790         800         810
CAC CCG GTC AAG GCC CTG GAT TTC CGT ACC CCC CGA AAT GCC AAA
          820         830         840         850
ATT GTC AAT GTC TGC AAC TGG ATC CTC TCT TCT GCC ATT GGT CTG
    860         870         880         890         900
CCC GTA ATG TTC ATG GCA ACC ACA AAA TAC AGG CAG GGG TCC ATA
          910         920         930         940
GAT TGC ACC CTC ACG TTC TCT CAT CCC ACA TGG TAC TGG GAG AAC
    950         960         970         980         990
CTG CTC AAA ATC TGT GTC TTC ATC TTC GCC TTC ATC ATG CCG GGC
         1000        1010        1020        1030
CTC ATC ATC ACT GTG TGT TAT GGA CTG ATG ATC TTA CAG CTC AAG
   1040        1050        1060        1070        1080
AGT GTC CGC ATG CTG TCG GGC TCC AAA GAA AAG GAC AGG AAC CTG
         1090        1100        1110        1120
CGC AGG ATC ACC CGG ATG GTG CTG GTG GTC GTG GCT GTA TTT ATT
   1130        1140        1150        1160        1170
GTC TGC TGG ACC CCC ATC CAC ATC TAT GTC ATC ATC AAA GCA CTG
         1180        1190        1200        1210
ATC ACG ATT CCA GAA ACC ACT TTC CAG ACT GTT TCC TGG CAC TTC
   1220        1230        1240        1250        1260
TGC ATT GCC TTG GGT TAC ACA AAC AGC TGC CTG AAC CCA GTT CTT
         1270        1280        1290        1300
TAT GCG TTC CTG GAT GAA AAC TTC AAA CGA TGT TTT AGA GAG TTC
   1310        1320        1330        1340        1350
TGC ATC CCA ACT TCC TCC ACA ATC GAA CAG CAA AAC TCT GCT CGA
         1360        1370        1380        1390
ATC CGT CAA AAC ACT AGG GAA CAC CCC TCC ACG GCT AAT ACA GTG
   1400        1410        1420        1430        1440
```

Figure 9 (2)

```
GAT CGA ACT AAC CAC CAG CTA GAA AAT CTG GAA GCA GAA ACT GCT

         1450         1460         1470         1480
         *            *            *            *
CCA TTG CCC TAA CTG GGT CCC ACG CCA TCC AGA CCC TCG CTA AAC

  1490         1500         1510         1520         1530
    *            *            *            *            *
TTA GAG GCT GCC ATC TAC TTG GAA TCA GGT TGC TGT CAG GGT TTG

         1540         1550         1560         1570
         *            *            *            *
TGG GAG GCT CTG GTT TCC TGG AAA AGC ATC TGA TCC TGC ATC ATT

  1580         1590         1600         1610         1620
    *            *            *            *            *
CAA AGT CAT TCC TCT CTG GCT ATT CAC GCT ACA CGT CAG AGA CAC

         1630         1640         1650         1660
         *            *            *            *
TCA GAC TGT GTC AAG CAC TCA GAA GGA AGA GAC TGC AGG CCA CTA

  1670         1680         1690         1700         1710
    *            *            *            *            *
CTG AAT CCA GCT CAT GTA CAG AAA CAT CCA ATG GAC CAC AAT ACT

         1720         1730         1740         1750
         *            *            *            *
CTG TGG TAT GTG ATT TGT GAT CAA CAT AGA AGG TGA CCC TTC CCT

  1760         1770         1780         1790         1800
    *            *            *            *            *
ATG TGG AAT TTT TAA TTT CAA GGA AAT ACT TAT GAT CTC ATC AAG

         1810         1820         1830         1840
         *            *            *            *
GGA AAA ATA GAT GTC ACT TGT TAA ATT CAC TGT AGT GAT GCA TAA

  1850         1860         1870         1880         1890
    *            *            *            *            *
AGG AAA AGC TAC CTC TGA CCT CTA GCC CAG TCA CCC TCT ATG GAA

         1900         1910         1920         1930
         *            *            *            *
AGT TCC ATA GGG AAT ATG TGA GGG AAA ATG TTG CTT CCA AAT TAA

  1940         1950         1960         1970         1980
    *            *            *            *            *
ATT TTC ACC TTT ATG TTA TAG TCT AGT TAA GAC ATC AGG GGC ATC

T
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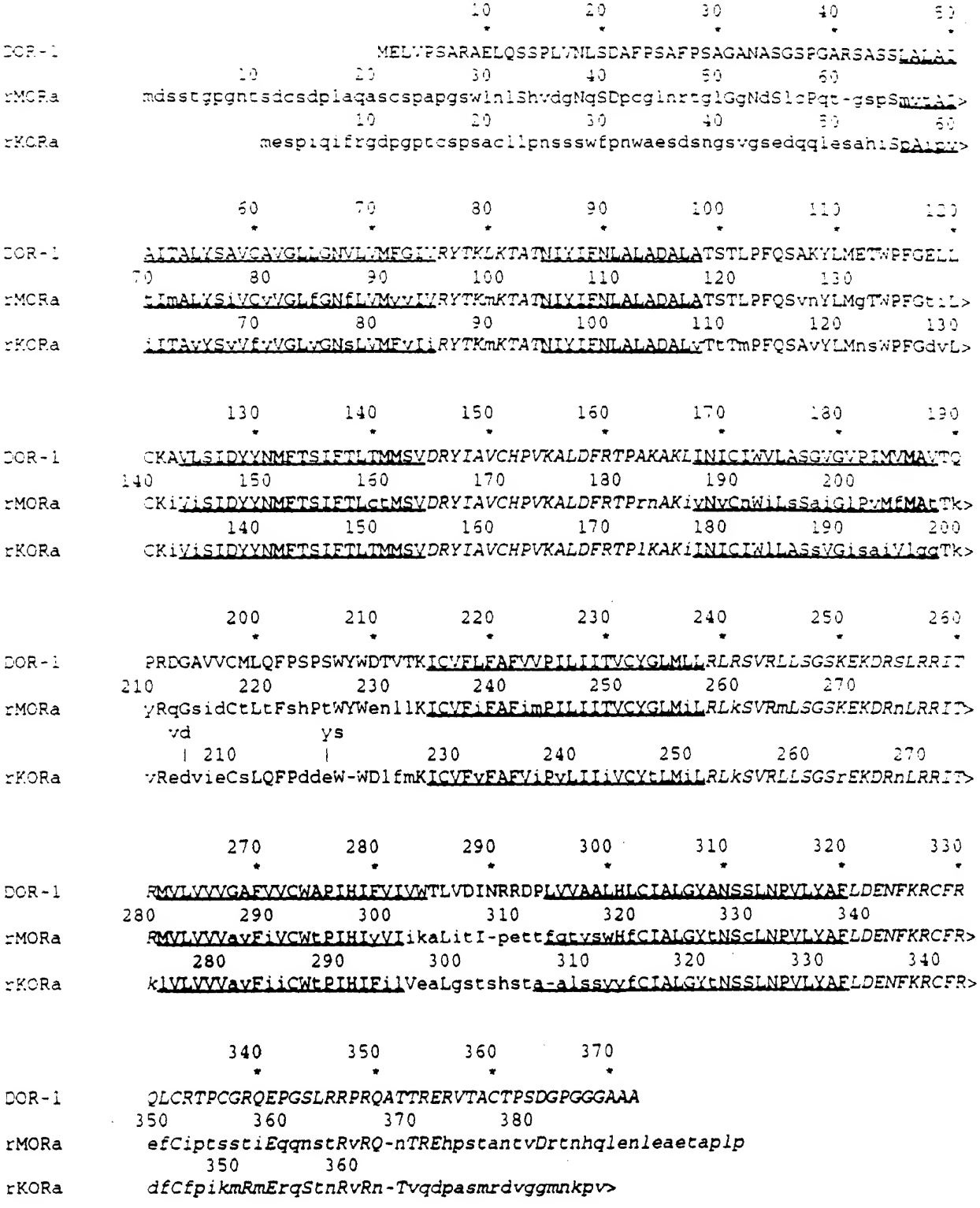
Figure 9 (3)

HIGH HOMOLOGY BETWEEN DELTA, MU AND KAPPA OPIOID RECEPTORS



Indentical amino acids beween DOR-1 and mu and kappa receptors in upper case
Predicted transmembrane domains are underlined

Figure 10

Sequence Range: 1 to 1805

START CODON

```
                                                                    54
GGC AGT GGC ATG GAG CCC CTC TTC CCC GCG CCG TTC TGG GAG GTT ATC TAC GGC

                                                                   108
AGC CAC CTT CAG GGC AAC CTG TCC CTC CTG AGC CCC AAC CAC AGT CTG CTG CCC

                                                                   162
CCG CAT CTG CTG CTC AAT GCC AGC CAC GGC GCC TTC CTG CCC CTC GGG CTC AAG

                                                                   216
GTC ACC ATC GTG GGG CTC TAC CTG GCC GTG TGT GTC GGA GGG CTC CTG GGG AAC

                                                                   270
TGC CTT GTC ATG TAC GTC ATC CTC AGG CAC ACC AAA ATG AAG ACA GCC ACC AAT

                                                                   324
ATT TAC ATC TTT AAC CTG GCC CTG GCC GAC ACT CTG GTC CTG CTG ACG CTG CCC

                                                                   378
TTC CAG GGC ACG GAC ATC CTC CTG GGC TTC TGG CCG TTT GGG AAT GCG CTG TGC

                                                                   432
AAG ACA GTC ATT GCC ATT GAC TAC TAC AAC ATG TTC ACC AGC ACC TTC ACC CTA

                                                                   486
ACT GCC ATG AGT GTG GAT CGC TAT GTA GCC ATC TGC CAC CCC ATC CGT GCC CTC

                                                                   540
GAC GTC CGC ACG TCC AGC AAA GCC CAG GCT GTC AAT GTG GCC ATC TGG GCC CTG

                                                                   594
GCC TCT GTT GTC GGT GTT CCC GTT GCC ATC ATG GGC TCG GCA CAG GTC GAG GAT

                                                                   648
GAA GAG ATC GAG TGC CTG GTG GAG ATC CCT ACC CCT CAG GAT TAC TGG GGC CCG

                                                                   702
GTG TTT GCC ATC TGC ATC TTC CTC TTC TCC TTC ATC GTC CCC GTG CTC GTC ATC

                                                                   756
TCT GTC TGC TAC AGC CTC ATG ATC CGG CGG CTC CGT GGA GTC CGC CTG CTC TCG

                                                                   810
GGC TCC CGA GAG AAG GAC CGG AAC CTG CGG CGC ATC ACT CGG CTG GTG CTG GTG
```

Fig 11

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                                                                    864
GTA GTG GCT GTG TTC GTG GGC TGC TGG ACG CCT GTC CAG GTC TTC GTG CTG GCC

                                                                    918
CAA GGG CTG GGG GTT CAG CCG AGC AGC GAG ACT GCC GTG GCC ATT CTG CGC TTC

                                                                    972
TGC ACG GCC CTG GGC TAC GTC AAC AGC TGC CTC AAC CCC ATC CTC TAC GCC TTC

                                                                   1026
CTG GAT GAG AAC TTC AAG GCC TGC TTC CGC AAG TTC TGC TGT GCA TCT GCC CTG

                                                                   1080
CGC CGG GAC GTG CAG GTG TCT GAC CGC GTG CGC AGC ATT GCC AAG GAC GTG GCC

                                                                   1134
CTG GCC TGC AAG ACC TCT GAG ACG GTA CCG CGG CCC GCA TGA CTA GGC GTG GAC
                                                  STOP CODON
                                                                   1188
CTG CCC ATG GTG CCT GTC AGC CCG CAG AGC CCA TCT ACG CCC AAC ACA GAG CTC

                                                                   1242
ACA CAG GTC ACT GCT CTC TAG GCG GAC ACA CCC TGG GCC CTG AGC ATC CAG AGC

                                                                   1296
CTG GGA TGG GCT TTT CCC TGT GGG CCA GGG ATG CTC GGT CCC AGA GGA GGA CCT

                                                                   1350
AGT GAC ATC ATG GGA CAG GTC AAA GCA TTA GGG CCA GCT CCA TGG CCC CAG ACA

                                                                   1404
GAC TAA AGC TGC CCT CCT GGT GCA GGG CCG AGG GGA GAC AAG GAC CTA CCT GGA

                                                                   1458
AGC AGC TGA CAT GCT GGT GGA CGG CCG TTA CTG GAG CCC GTG CCC CTC CCT CCC

                                                                   1512
CGT GCT TCA TGT GAC TCT TGG CCT CTC TGC TGC TGC GTT GGC AGA ACC CTG GGT

                                                                   1566
GGG CAG GCA CCC GGA GGA GGA GCA GCA GCT GTG TCA TCC TGT GCC CCC CAT GTG

                                                                   1620
CTG TGT GCT GTT TGC ATG GCA GGG CTC CAG CTG CCT TCA GCC CTG TGA CGT CTC

                                                                   1674
```

CTC AGG GCA GCT GGA CAG GCT TGG CAC GGC CCG GGA AGT GCA GCA GGC AGC TTT

1728

TCT TTG GGG TGG GAC TTG CCC TGA GCT TGG AGC TGC CAC CTG GAG GAC TTG CCT

1782

GTT CCG ACT CCA CCT GTG CAG CCG GGG CCA CCC CAG GAG AAA GTG TCC AGG TGG

GGG CTG GCA GTC CCT GGC TGC AG

```
                10        20        30        40        50        60
hMOR    MDSSAAPT¥AS¥CTDALAYSSCSPAPSPGSWV¥LSHLDG¥LSDPCGP¥RTNLGGRDSLCPPTGSP
                                                                  ↑g
hDOR                          mePAPSaGaelq-ppLfa¥aSDaypsacpsaGa¥aSgpParsas
mKOR            mespiqifrgdpgptcspSaC-llP¥ssSWfp-nwaesds¥gsvGsedqqLes-ahi-sP-aiP
                                          ↑ev                             ↑f
ORL1                          meplfPaP-fWiygSHLqG¥LSll-sP¥hsllLpphlll¥ashGal
ORL2                                                meeggdfdnyygad¥qSeCeyTdwk

                 •70••••••••80••••••••90•••••• 100     ••110•••••••120       130
hMOR    SMITAITIMALYSIVCVVGLFGNFLVMYVIVRYTKMKTATNIYIFNLALADALATSTLPFQSVNY
hDOR    SlalAIaItALYSaVCaVGLlGNvLVMfgIVRYTKMKTATNIYIFNLALADALATSTLPFQSakY
mKOR    -vI--IT--AvYSvVfVVGLvGNsLVMfVIiRYTKMKTATNIYIFNLALADALvTtTmPFQSavY
ORL1    plglkvTIvgLYlaVCVgGLlGNcLVMYVIlRhTKMKTATNIYIFNLALADtLvllTLPFQgtdi
                                          ↑e                            ↑w
ORL2    S-sgAl-IpAiYmlVfllGttGNgLVlwtvfRssrkrrsadIfIasLAvADltfvvTLPlatytY

              140    •••150•••••••160•••••  170       180       190•••••
hMOR    LMGTWPFGTILCKIVISIDYYNMFTSIFTLCTMSVDRYIAVCHPVKALDFRIPRNAKIINVCNWI
hDOR    LMeTWPFGelLCKaVlSIDYYNMFTSIFTLtmMSVDRYIAVCHPVKALDFRTPakAKlINiCiWv
mKOR    LMnsWPFGdvLCKIVISIDYYNMFTSIFTLtmMSVDRYIAVCHPVKALDFRTPlkAKIINiCiWl
ORL1    LlGfWPFGnaLCKtVIaIDYYNMFTStFTLtaMSVDRYvAiCHPirALDvRTsskAqavNVaiWa
ORL2    rdydWPFGTffCKlssylifvNMyaSvFcLtglSfDRYlAivrPVanarlRlrvsgavatavlWv

                ••200•••••••210       220       230     ••240•••••••250•••••••260
hMOR    LSSAIGLPVMFMATTKYRQGSIDCTLTFSHPTWYWENLVKICVFIFAFIMPVLIITVCYGLMILR
hDOR    LaSgvGvPiMvMAvTrpRdGavvCmLqFpsPsWYWdtvtKICVFlFAFvvPiLIITVCYGLMlLR
                          ↑dv         ↑ys
mKOR    LaSsvGisaivlggTKvRedvIeCsLqFpddeW-WdlfmKICVFvFAFviPVLIIiVCYtLMILR
hORL1   LaSvvGvPVaiMgsaqvedeeIeClveiptPqdYWgpvfaICiFlFsFIvPVLvIsVCYsLMIrR
                    ↑r       ↑k      ↑mvatv
hORL2   LaallamPVMvltTgdlenttvqCymdySsseWaWEvglgvssttvgFvvPftImltCY-ffIaq

              270       280  •••••290•••••••300•      310     •••320 ••••
hMOR    LKSVRMLSGSKEKDRNLRRIIRMVLVVVAVFIVCWTPIHIYVIIKALVTIPETTFQTVSWHFCIA
                                                              ↑d
hDOR    LrSVRlLSGSKEKDRsLRRIIRMVLVVVgaFvVCWaPIHIfVIvwtLVdIrrdplvvaalHlCIA
mKOR    LKSVRlLSGSrEKDRNLRRIIklVLVVVAVFIiCWTPIHIfilveALgstshsTaalsSyyFCIA
ORL1    LrgVRlLSGSrEKDRNLRRIIRlVLVVVAVFvgCWTPvqvfVlaqgLgvqPssetavailrFCtA
                                                  ↑lvkt       ↑f
ORL2    tiaghfrkeriEglRkrRRllsiivVlVvtFalCWmPyHlYmlgsllHwpcddlFlmnifpyCtc

                ••330•••••••340       350       360       370       380       390
hMOR    LGYTNSCLNPVLYAFLDENFKRCFREFCIPTSSNIEQQNSTRIRQNIRDHPSTANTVDRTNHQLE
hDOR    LGYaNSsLNPVLYAFLDENFKRCFRqlCrkpcgrpdpssfsRaReaIarervTActpsdgpggga>
mKOR    LGYTNSsLNPVLYAFLDENFKRCFRdFCfPikmrmErQstnRvR-NTvqdPasmrdVggmnkpv
ORL1    LGYvNSCLNPiLYAFLDENFKaCFRkFCcasalrrdvQvSdRvRsiakDvalackTsetvprpa
                              ↑q
ORL2    isYvNSCLNPfLYAFfDprFraCtsmlCcgqSrcagtshSssgeksasyssghsqgpgpnmgkgg

                400.
hMOR    NLEAETAPLP
h-DOR   aa
ORL2    eqmheksipysqetlvvd
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Fig 1. COMPARISON OF ORL1 & ORL2 PROTEIN SEQUENCES WITH μ,∂ & κ RECEPTORS Regions overscored with ••••••• represent predicted transmembrane domains. The symbol ¥ represents extracellular Asn residues that are consensus sites for N-linked glycosylation. Consensus PKA/PKC sites are underlined. The Genbank references are: for hMOR (Human mu receptor), Wang et al., Accession# L25119; for hDOR (human delta opioid receptor) Simonin et al., Accession# U10504; and for mKOR (murine kappa opioid receptor), Yasuda et al., Accession# L11065.